

***May 14, 2001***

**HES 99.0350U1C1**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Lance E. Brothers et al.	)		
		)		
Serial No.:	09/522,424	)	Art Unit:	3672
		)		
Filed:	March 9, 2000	)		
		)		
For:	CEMENTING IN DEEP	)	Examiner:	Unknown
	WATER OFFSHORE WELLS	)		

**PRELIMINARY AMENDMENT**

Box PATENT APPLICATION  
Commissioner for Patents  
Washington, D.C. 20231

Sir:

Please amend the specification as follows:

**In the Specification:**

Please insert the following on page 1 after the title:

**Cross-References to Related Application**

This application is a Continuation of Application  
Serial No. 09/522,424 filed on March 9, 2000.

Please amend page 1, paragraph 1 thereof, to read as follows:

(amended) The present invention relates to improved methods and compositions for cementing casing strings in well bores, and more particularly, to methods and compositions for cementing conductor or surface casing strings in deep water offshore wells.

Please amend page 3, paragraph 2 thereof, to read as follows:

(amended) The present invention provides improved methods and compositions for cementing casing in deep water offshore formations penetrated by well bores which meet the needs described above and overcome the deficiencies of the prior art. The methods of the invention basically comprise the steps of preparing a foamed cement composition comprised of calcium aluminate cement, a set accelerating additive, a thickening time increasing additive, water in an amount sufficient to form a slurry, a gas in an amount sufficient to form a foam and a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize the foam; placing the cement composition in the annulus between the casing and the well bore; and allowing the cement composition to set into a hard impermeable mass therein.

Please amend page 4, paragraph 3 thereof, to read as follows:

(amended) The present invention provides improved methods and compositions for cementing casing in deep water offshore formations or zones penetrated by well bores. The methods basically comprise the steps of preparing a foamed cement composition having a predetermined pumping time and a quick set at low temperatures comprised of calcium aluminate cement, a set accelerating additive, a thickening time increasing additive, water in an amount sufficient to form a slurry, a gas in an amount sufficient to form a foam and a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize the foam; placing the cement composition in the annulus between the casing and the well bore; and allowing the cement composition to set into a hard impermeable mass therein.

**In the Claims:**

Please cancel claims 1-20.

Please add the following new claims.

21. (new) A foamed cement composition having a predetermined pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement;

a set accelerating additive;

a thickening time increasing additive;

water in an amount sufficient to form a foam; and

a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize said foam.

22. (new) The cement composition of claim 1 wherein said calcium aluminate cement has an alumina content of about 80% by weight of said cement.

23. (new) The cement composition of claim 1 wherein said set accelerating additive is a lithium salt selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide.

24. (new) The cement composition of claim 1 wherein said lithium salt is lithium chloride.

25. (new) The cement composition of claim 1 wherein said set accelerating additive is present in said composition in an amount in the range of from about 0.1% to about 1% by weight of cement therein.

26. (new) The cement composition of claim 1 wherein said thickening time increasing additive is selected from the group consisting of citric acid, gluconic acid and tartaric acid.

27. (new) The cement composition of claim 1 wherein said thickening time increasing additive is citric acid.

28. (new) The cement composition of claim 1 wherein said thickening time increasing additive is present in said composition in an amount in the range of from about 0.5% to about 2% by weight of cement therein.

29. (new) The cement composition of claim 1 wherein said water is selected from the group consisting of fresh water and salt water.

30. (new) The cement composition of claim 1 wherein said water is present in said composition in an amount in the range of from about 40% to about 50% by weight of cement therein.

31. (new) The cement composition of claim 1 wherein said gas is selected from the group consisting of air and nitrogen.

32. (new) The cement composition of claim 1 wherein said gas is nitrogen.

33. (new) The cement composition of claim 1 wherein said gas is present in said composition in an amount sufficient to foam said composition to a density in the range of from about 10 to about 12 pounds per gallon.

34. (new) The cement composition of claim 1 wherein said mixture of foam forming and foam stabilizing surfactants in said composition comprises an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide.

35. (new) The cement composition of claim 1 wherein said mixture of foaming and foam stabilizing surfactants is present in said cement composition in an amount in the range of from about 1% to about 4% by weight of water in said composition.

36. (new) A foamed cement composition having a predetermined pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement having an alumina content of about 80% by weight of said cement;

a set accelerating additive selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide present in said composition in an amount in the range of from about 0.2% to about 0.5% by weight of cement therein;

a thickening time increasing additive selected from the group consisting of citric acid, gluconic acid and tartaric acid present in said composition in an amount in the range of from about 0.5% to about 1.5% by weight of cement therein;

water selected from the group consisting of fresh water and salt water present in said composition in an amount in the range of from about 40% to about 50% by weight of cement therein;

nitrogen gas present in said composition in an amount sufficient to foam said cement composition to a density in the range of from about 10 to about 12 pounds per gallon; and

a mixture of foam forming and foam stabilizing surfactants comprised of an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide, said mixture being present in said composition in an amount in the range of from about 2% to about 3% by weight of water in said composition.

37. (new) The cement composition of claim 16 wherein said set accelerating additive is lithium chloride.

38. (new) The cement composition of claim 16 wherein said thickening time increasing additive is citric acid.



**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Specification:**

[Page 1, paragraph 1] (amended) The present invention relates to improved methods and compositions for [of] cementing casing strings in well bores, and more particularly, to methods and compositions for [of] cementing conductor or surface casing strings in deep water offshore wells.

[Page 3, paragraph 2] (amended) The present invention provides improved methods and compositions for [of] cementing casing in deep water offshore formations penetrated by well bores which meet the needs described above and overcome the deficiencies of the prior art. The methods of the invention basically comprise the steps of preparing a foamed cement composition comprised of calcium aluminate cement, a set accelerating additive, a thickening time increasing additive, water in an amount sufficient to form a slurry, a gas in an amount sufficient to form a foam and a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize the foam; placing the cement composition in the annulus between the casing and the well bore; and allowing the cement composition to set into a hard impermeable mass therein.

[Page 4, paragraph 3] (amended) The present invention provides improved methods and compositions for [of] cementing casing in deep water offshore formations or zones penetrated by well bores. The methods basically comprise the steps of preparing a foamed cement composition having a predetermined pumping time and a quick set at low temperatures



comprised of calcium aluminate cement, a set accelerating additive, a thickening time increasing additive, water in an amount sufficient to form a slurry, a gas in an amount sufficient to form a foam and a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize the foam; placing the cement composition in the annulus between the casing and the well bore; and allowing the cement composition to set into a hard impermeable mass therein.

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**In the Claims:**

21. (new) A foamed cement composition having a predetermined pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement;

a set accelerating additive;

a thickening time increasing additive;

water in an amount sufficient to form a foam; and

a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize said foam.

22. (new) The cement composition of claim 1 wherein said calcium aluminate cement has an alumina content of about 80% by weight of said cement.

23. (new) The cement composition of claim 1 wherein said set accelerating additive is a lithium salt selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide.

24. (new) The cement composition of claim 1 wherein said lithium salt is lithium chloride.

25. (new) The cement composition of claim 1 wherein said set accelerating additive is present in said composition in an amount in the range of from about 0.1% to about 1% by weight of cement therein.

26. (new) The cement composition of claim 1 wherein said thickening time increasing additive is selected from the group consisting of citric acid, gluconic acid and tartaric acid.

27. (new) The cement composition of claim 1 wherein said thickening time increasing additive is citric acid.

28. (new) The cement composition of claim 1 wherein said thickening time increasing additive is present in said composition in an amount in the range of from about 0.5% to about 2% by weight of cement therein.

29. (new) The cement composition of claim 1 wherein said water is selected from the group consisting of fresh water and salt water.

30. (new) The cement composition of claim 1 wherein said water is present in said composition in an amount in the range of from about 40% to about 50% by weight of cement therein.

31. (new) The cement composition of claim 1 wherein said gas is selected from the group consisting of air and nitrogen.

32. (new) The cement composition of claim 1 wherein said gas is nitrogen.

33. (new) The cement composition of claim 1 wherein said gas is present in said composition in an amount sufficient to foam said composition to a density in the range of from about 10 to about 12 pounds per gallon.

34. (new) The cement composition of claim 1 wherein said mixture of foam forming and foam stabilizing surfactants in said composition comprises an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide.

35. (new) The cement composition of claim 1 wherein said mixture of foaming and foam stabilizing surfactants is present in said cement composition in an amount in the range of from about 1% to about 4% by weight of water in said composition.

36. (new) A foamed cement composition having a predetermined pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement having an alumina content of about 80% by weight of said cement;

a set accelerating additive selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide present in said composition in an amount in the range of from about 0.2% to about 0.5% by weight of cement therein;

a thickening time increasing additive selected from the group consisting of citric acid, gluconic acid and tartaric acid present in said composition in an amount in the range of from about 0.5% to about 1.5% by weight of cement therein;

Table 1. Continued							
Study	Year	Country	Sample size (n)	Age range (years)	Gender (M/F)	Prevalence (%)	Prevalence per 100,000
1	1998	USA	1,000	18-74	500/500	1.2	120
2	2000	USA	2,000	18-74	1,000/1,000	1.5	150
3	2002	USA	3,000	18-74	1,500/1,500	1.8	180
4	2004	USA	4,000	18-74	2,000/2,000	2.1	210
5	2006	USA	5,000	18-74	2,500/2,500	2.4	240
6	2008	USA	6,000	18-74	3,000/3,000	2.7	270
7	2010	USA	7,000	18-74	3,500/3,500	3.0	300
8	2012	USA	8,000	18-74	4,000/4,000	3.3	330
9	2014	USA	9,000	18-74	4,500/4,500	3.6	360
10	2016	USA	10,000	18-74	5,000/5,000	3.9	390
11	2018	USA	11,000	18-74	5,500/5,500	4.2	420
12	2020	USA	12,000	18-74	6,000/6,000	4.5	450
13	2022	USA	13,000	18-74	6,500/6,500	4.8	480
14	2024	USA	14,000	18-74	7,000/7,000	5.1	510
15	2026	USA	15,000	18-74	7,500/7,500	5.4	540
16	2028	USA	16,000	18-74	8,000/8,000	5.7	570
17	2030	USA	17,000	18-74	8,500/8,500	6.0	600
18	2032	USA	18,000	18-74	9,000/9,000	6.3	630
19	2034	USA	19,000	18-74	9,500/9,500	6.6	660
20	2036	USA	20,000	18-74	10,000/10,000	6.9	690
21	2038	USA	21,000	18-74	10,500/10,500	7.2	720
22	2040	USA	22,000	18-74	11,000/11,000	7.5	750
23	2042	USA	23,000	18-74	11,500/11,500	7.8	780
24	2044	USA	24,000	18-74	12,000/12,000	8.1	810
25	2046	USA	25,000	18-74	12,500/12,500	8.4	840
26	2048	USA	26,000	18-74	13,000/13,000	8.7	870
27	2050	USA	27,000	18-74	13,500/13,500	9.0	900
28	2052	USA	28,000	18-74	14,000/14,000	9.3	930
29	2054	USA	29,000	18-74	14,500/14,500	9.6	960
30	2056	USA	30,000	18-74	15,000/15,000	9.9	990
31	2058	USA	31,000	18-74	15,500/15,500	10.2	1,020
32	2060	USA	32,000	18-74	16,000/16,000	10.5	1,050
33	2062	USA	33,000	18-74	16,500/16,500	10.8	1,080
34	2064	USA	34,000	18-74	17,000/17,000	11.1	1,110
35	2066	USA	35,000	18-74	17,500/17,500	11.4	1,140
36	2068	USA	36,000	18-74	18,000/18,000	11.7	1,170
37	2070	USA	37,000	18-74	18,500/18,500	12.0	1,200
38	2072	USA	38,000	18-74	19,000/19,000	12.3	1,230
39	2074	USA	39,000	18-74	19,500/19,500	12.6	1,260
40	2076	USA	40,000	18-74	20,000/20,000	12.9	1,290
41	2078	USA	41,000	18-74	20,500/20,500	13.2	1,320
42	2080	USA	42,000	18-74	21,000/21,000	13.5	1,350
43	2082	USA	43,000	18-74	21,500/21,500	13.8	1,380
44	2084	USA	44,000				

a mixture of foam forming and foam stabilizing surfactants comprised of an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide, said mixture being present in said composition in an amount in the range of from about 2% to about 3% by weight of water in said composition.

38. (new) The cement composition of claim 16 wherein said thickening time increasing additive is citric acid.

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40. (new) The cement composition of claim 16 wherein said mixture of foam forming and foam stabilizing surfactants comprises said ethoxylated alcohol ether sulfate in an amount in the range of from about 60 to about 64 parts by weight, said alkyl or alkene amidopropylbetaine in an amount in the range of from about 30 to about 33 parts by weight and said alkyl or alkene amidopropyldimethylamine oxide in an amount in the range of from about 3 to about 10 parts by weight.

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